DOCUMENT RESUME

ED 086 187 IR 000 034

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TITLE	CONDUIT Test Materials at the University of Texas at Austin.
INSTITUTION	Duke Univ., Durham, N. C. CONDUIT.
SPONS AGENCY	National Science Foundation, Washington, D.C.
PUB DATE	Sep 73
NOTE	66p.; CONDUIT (Texas) 3
EDRS PRICE	MF-$0.65 HC-$3.29
DESCRIPTORS	Annotated Bibliographies; Biology; Business Administration; Chemistry; *Computer Assisted Instruction; *Computer Programs; *Consortia; Economics; *Higher Education; Mathematics; *Networks; Physics; Regional Programs; Social Sciences
IDENTIFIERS	CONDUIT

ABSTRACT

Computer-assisted instructional programs in seven content areas--mathematics, social science, physics, chemistry, biology, business and economics--are listed and described. These programs have been selected by content specialists as representative of the field and available for test purposes in connection with the regional network of Computers at Oregon State University, North Carolina Educational Computing Services, Dartmouth College, and the Universities of Iowa and Texas (CONDUIT). User reactions to these programs will be studied by researchers for two general purposes, the first of which is to evaluate the pedagogical and economic impact of computer-based techniques and to gather information on the factors associated with transferring these techniques to other educational environments. The second purpose is to create standards by which potential candidates for inclusion in the CONDUIT resource center may be judged and to determine which of these test programs are suitable for wide use. (Author/PB)

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CONDUIT

A consortium of regional networks at
Oregon State University, North Carolina Educational Computing Service,
Dartmouth College, and the Universities of Iowa and Texas (Austin).
Central Office at Duke University

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CONDUIT Test Materials

at The University of Texas at Austin

CONDUIT Project

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September 1973

NSF Grant EC 31753

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PREFACE

CONDUIT, Computers at Oregon State University, North Carolina Educational Computing Services, Dartmouth College, and the Universities of Iowa and Texas, is a consortium of regional computer networks sponsored by the National Science Foundation. One of the objectives of CONDUIT is to prepare a library of computer-based curriculum materials in a variety of academic disciplines.

The CONDUIT project has organized specialists from colleges and universities across the nation into "discipline committees" for mathematics, social sciences, physics, chemistry, biology, business and economics who are seeking to identify other computer-based curriculum materials, to evaluate the pedagogical and economic impact of computer-based techniques, and to gather information on the factors associated with transferring the techniques to other educational environments. Computer-based curriculum materials have been transferred to 100 different campuses where they are being evaluated in live classroom situations.

The materials described in this document were selected by the disciplinary committees as being representative of the field and available for test purposes. As such they are being used to gather information and create standards for programs to be included in a CONDUIT resource center,

but they will not necessarily meet proposed standards. User's reactions to these materials will be used to formulate standards and to decide which of the included programs meet CONDUIT criteria of educational value, transportability, documentation, and technical validity.

Use of the programs described in this document will require a basic knowledge of the University of Texas Computation Center CDC 6600/6400 batch and timesharing (TAURUS) operating systems. Users unfamiliar with batch job submission procedures should read Chapter 8 of the Computation Center User's Manual, which is available from the University Cooperative Bookstore, 2246 Guadalupe, Austin, Texas 78705.

Users unfamiliar with the TAURUS system should obtain a copy of Technical Programming Bulletin TPB-121, "Introduction to TAURUS", from the University of Texas Computation Center, and read Chapter 11 of the Computation Center User's Manual. Users of the materials described herein may receive special assistance when necessary from Dr. George H. Culp, CONDUIT Curriculum Coordinator at the University of Texas. Copies of input and output should be included with any such communication.

Further information about CONDUIT may be obtained by writing to Dr. C. H. Warlick, Director, Computation Center, University of Texas at Austin, Austin, Texas 78712.

CONDUIT Programs for Biology

The CONDUIT Biology programs are based on a text, A Handbook of Computer Applications in Biology, available from the University of Iowa Regional Computer Center, Iowa City, Iowa 52240. Only twelve programs described in that text are currently available. Other programs will be implemented subject to sufficient demand from users.

Program names are keyed to the text in the following way: each program name is of the form "Bijjk", where "i" is the chapter number, "jj" is the section number, and "k" is the sequence within that chapter, or zero if it is the only program in that section. Thus, program B3010 is the only program in Section 3.01, program B5042 is the second program in Section 5.04, etc.

Programs Currently Available:

Ecology.

B3010 - The Effect of Limiting Population.

B3050 - Cannibalism.

B3080 - Calculation of the Volume of a Lake.

B3100 - Salmon Fishery Game (Interactive usage only).

Genetics.

B4030 - Linkage and Chromosome Mapping.

B4080 - A Two-Allele Population Genetics Model.

Physiology/Microbiology.

B5020 - Effect of Nutrient Additions on the Growth of Bacteria.

B5041 - Physiological Buffer Systems.

B5042 - Physiological Buffer Systems.

B5043 - Physiological Buffer Systems.

B5091 - Temperature Conversions.

B5092 - Temperature Effects on Biological Activities.

Deck Structure for Batch Jobs

User Identification Card
Password Card
Job Card (if necessary)
EXECPF(3074,Bnnnn) where "Bnnnn" is the program name as described above
7/8/9 end-of-record card
data
6/7/8/9 end-of-file card

Deck Structure for TAURUS Jobs

1. Login using usual procedures.
2. When "CC:" message is printed, enter EXECPF (3074,Bnnnn, TTY,TTY) for input and output at the terminal (omit the last TTY if output by the Computation Center line printer is desired) where "Bnnnn" is the name of the program as described earlier.
3. When "GO:" message is printed and the input indicator (normally the audible bell sound) is received, begin entering data according to the format described in the text.

4. When all the data is entered, depress the CTRL and G keys simultaneously, then type "EOF" and depress the return key to signal end of input.
5. Logout using usual procedures (If output is desired, LOGOUT=0).

CONDUIT Programs for Business

The University of Texas has two integrated business packages. Both packages relate to the area of operations management or quantitative techniques and have student texts/manuals associated with them. However, each unit is complete in itself and may be used independently as a part of courses in many areas.

All programs were written in Fortran primarily for batch job entry mode, but may be executed under TAURUS. Control cards for submitting jobs under either mode are described at the end of this section. The binary (executable) form of each program is contained as a permanent file (named with the program name) in the set of permanent files with Identification Number (ID) 4343.

MATERIALS BY: D. Clay Whybark and N. L. Berry
Krannert Graduate School of Industrial Administration
Purdue University, Lafayette, Indiana

Supporting Documentation:

Text and instructors manual available from Southwestern Publishing Co.: Berry and Whybark, Operations and Logistics Management: Computer-Augmented Cases. (Southwestern Publishing Co., Cincinnati, 1972).

Programs Currently Available:

HORN - Program simulates distribution of Hornby products. Matrix of variable costs from warehouse locations to demand centers is provided in data statement. Simulation allows manager to investigate combinations of warehouses for serving demand centers. Lowest

cost warehouse being investigated is assigned for each demand center. Summary costs and warehouse assignments are printed. Matrix is ten warehouses by 20 demand centers. Five configurations per run.

HUTC - Program computes total variable costs of servicing tanks and transportation for shipping schedule specified by user. Input consists of tank servicing facilities to be used and amount to be shipped from each facility to each user.

MARQ - Program evaluates alternative quality control parameter for sample size, sample frequency, critical number, run length for Marquis Company case. Student supplies values for press reset, and 100 percent inspection parameters. Any number of quality control programs can be evaluated in a single run.

NICK - Program applies an adaptive smoothing model on the demand for a brake part. Student supplies values for alpha for first and second period after shift in demand and base value of alpha. Any number of evaluations can be made in a run.

NATB - Program tests alternative production scheduling rules for use in Natco Machine Shop. Student selects scheduling rule to be evaluated and supplies parameter values for inventory level and due date factors.

GAME - Program simulates Gaming Company case and allows variation of policies to be tested by students. Students input policy code, parameter ranges, and increments for range.

NATD - Program tests alternative production scheduling rules and inventory control parameters. Student selects inventory control parameters and selects scheduling rule to be evaluated. Any number of scheduling rules or parameter sets can be evaluated in a single run.

OROA - Program computes fish production forecast for Oro Del Mar for 1964, and the forecast errors (bias and standard deviation) for 1959-63 using one-year-in-advance forecasts.

OROB - Program computes total cost of production plans specified from students for the Oro Del Mar case. Student must specify work force and production level for each month of a year. Program develops hiring-

firing costs, inventory costs, overtime costs, and feasibility.

MCAL - Program evaluates performance of marketing stand assembly operation with two operators. Student declares opening inventory between two operators at start of shift. Program simulates assembly of 100 stands. Times are pre-determined. One evaluation per run.

Sample runs are available for reference. Contact the CONDUIT Curriculum Coordinator.

MATERIALS BY: Roy Harris and Michael Maggard
College of Business Administration
University of Texas, Austin, Texas

Supporting Documentation:

Text and instructors manual available from publisher: Harris and Maggard, Computer Models in Operations Management (Harper and Row, New York, 1972)

Programs Currently Available:

BEARSIM - Program demonstrates how various maintenance policies for a particular maintenance situation may be evaluated through use of the Monte Carlo Simulation Technique.

EOQ - Program computes most economical inventory order quantity under a variety of conditions, including price discounts, shortage cost and shortage limitations.

UNISIM - Program simulates decisions faced by operations manager in a one-product company. The basic decision is the level of scheduled output, but the user may also specify automatic adjustments to this scheduled level. The effectiveness of the decisions may be tested against three different demand patterns for thirty-six periods.

FUTURE - Program consists of a statistical forecasting model which computes forecasts by the statistical methods of mean, regression line, seasonal

averages, seasonal regression line, moving average, and exponential smoothing.

DECIDE - Program solves decision problems structured as a decision tree with both decision branches and chance event branches. Probability of each chance event must be given. If (optional) interest rates are included, DECIDE will include present value computations in determining best decisions based on expected present value of that decision.

INSYS - Program computes inventory levels and factory output for a factory wholesaler-retailer inventory system. Inventory replenishment and lead time policies may be changed in order to test effect of the policies on performance of overall system.

QUESIM - QUESIM is a simulation model for single-phase, multiple-channel queueing systems. The performance of one to nine channels may be investigated under a variety of arrival and service parameters for a variety of associated costs.

BALANCE - Program contains five different heuristic decision rules which will solve assembly line balancing problems. User must choose whether to set the desired number of stations in the solution or to set the desired cycle time.

CRIT - Program solves project scheduling problems which are formulated in terms of a network; known as pert or cpm (critical path method). Input includes project activities, time estimates, precedence relationships. Output is total project time, float for each activity, and critical path. Available in draft form as sample case.

SQC - Model computes control charts for mean and range of a group of sample data. Based on computed control limits, SQC will indicate whether process is in or out of control.

The following two programs by Harris are not included in his text. They are currently available on the system, and a source listing and/or sample input may be obtained from the Curriculum Coordinator on request.

INVSYM - This program is a sophisticated version of INSYS which computes inventory levels.

BUYCAR - This program is a cost effectiveness model. Cost effectiveness is defined as consumer attempts to maximize quality of purchase while minimizing the cost. Program uses predefined matrix to implement.

Sample runs are available for reference. Contact the CONDUIT Curriculum Coordinator.

Running the Programs:

Batch setup:

User Identification Card
Password Card
EXECPF,4343,*name*
(where *name* is one of the above programs, i.e., MCAL,HORN,...)
7/8/9 End of Record Card
Data Deck
6/7/8/9 End of File Card

TAURUS setup:

a) Login according to usual procedure.

b) After receiving the "CC:" message, type
EXECPF,4343,*name*,TTY,TTY. Ⓡ
(where *name* is as above and Ⓡ denotes the carriage return key)

c) After receiving the "GO:" message and the input indicator (Bell), enter the data, line by line.

d) Logout according to usual procedure.

CONDUIT Programs for Chemistry

For the 1972 transportability test CONDUIT selected thirty-seven independent modules from a variety of sources. While these modules are independent, the approach they take to the discipline should be viewed in toto. That is, the programs taken together should produce much more than the sum of the parts, and a single module out of context produces little. For convenience the materials are organized below by subject rather than author. The word "batch" or "interactive" following each program name indicates the current implementation. Users desiring to change the mode of implementation should contact the Curriculum Coordinator.

MATERIALS BY:

a) K. Jeffery Johnson
University of Pittsburgh
Pittsburgh, Pennsylvania 15213

b) R. W. Collins and Robert C. Gerisch
Eastern Michigan University
Ypsilanti, Michigan 48197

c) J. R. Denk
North Carolina Educational Computing Services
Box 12175,
Research Triangle, North Carolina 27709

d) J. J. Lagowski, et al.,
The University of Texas at Austin
Austin, Texas 78712

e) Others as noted.

REFERENCES:

a) K. J. Johnson, Numerical Methods in Chemistry, 2nd edition (University of Pittsburgh, 1973). Also see articles by Johnson in 1970, 1971 and 1972 Proceedings of a Conference on Computers in the Undergraduate Curricula.

b) R. W. Collins, "Teaching Programming Languages and Optimizing Non-interactive Computer Application in the Chemistry Curriculum," Proceedings of a Conference on Computers in the Undergraduate Curricula, Dartmouth College, 1971.

DOCUMENTATION:

a) Program writeups for approximately 21 of the programs are contained in Numerical Methods in Chemistry, 2nd Edition, by K. Jeffery Johnson. This text is available from the University of Pittsburgh, Pittsburgh, Pennsylvania.

b) Program writeups for certain other programs are available from CONDUIT-NCECS, P. O. Box 12175, Research Triangle, North Carolina, 27709.

c) Documentation for the two CAI modules (CHEM200 and CHEM32) is available from the Project Computer-Based Education, Engineering Laboratory Building 413, The University of Texas, Austin, Texas 78712.

USING THE UNIVERSITY OF TEXAS SYSTEM:

This document assumes a general knowledge of the University of Texas System. Only the specific control card for accessing each individual program is given.

Author documentation, source listings, and sample runs are available for reference from the CONDUIT Curriculum Coordinator. Users must obtain their own copies of such documentation.

Programs Currently Available:

Aqueous Equilibria.

- SOL (Interactive)

Abstract: SOL will handle polyvalent cations and anions, e.g., $Ca_3(PO_4)_2$. This program calculates the solubility of the sparingly soluble salt, MX, as a function of pH.

$MX_{(s)}$ $M^{z+} + X^{z-}$ $K_{sp} = [M^{z+}][X^{z-}]$, z = 1,2,3,4

The anion, X^{z-}, will hydrolyze to form z conjugate acids: HX^{z-1}, H_2X^{z-2},...,H_zX.

The program requires z, pK_{sp} (negative logarithm of the solubility product) and the pK_i (negative logarithm of stepwise dissociation constant) values. For example, for CaC_2O_4, pK_{sp} = 8.87, pK_1 = 1.25 and pK_2 = 4.28. The program prints the input data for verification purposes and a table containing pH, the common logarithm of the solubility for $0 \leq pH \leq 15$. Used in Analytical and General Chemistry.

Access:

TAURUS: EXECPF,4632,SOL.

Batch: Contact Curriculum Coordinator.

Documentation: K. Jeffery Johnson, Numerical Methods in Chemistry, p. 360.

- HA (Interactive)

Abstract: Simulates the weak acid - strong base titration. Input to the program includes: C_A (molar concentration of weak acid), C_B (molar concentration of titrant strong base), V_A (volume in milliliters of acid) and pKa (negative logarithm of dissociation constant of acid). The output includes the input data for verification purposes and a table of percent titration, pH and volume of base added. Used in Biochemistry and in Analytical and General Chemistry.

Access:

TAURUS: EXECPF,4638,HA.

Batch: Contact Curriculum Coordinator

Documentation: K. Jeffery Johnson, Numerical Methods in Chemistry, p. 324.

- EDTA (Interactive)

Abstract: This program simulates the M^{2+}-EDTA titration as a function of the pH at which the system is buffered, the formation constant of the M^{2+}-$EDTA^{4-}$ complex (K_f) and the metal ion concentration. Input includes: pH, K_f, metal ion concentration, titrant EDTA concentration, and optionally, the initial volume of the metal

ion solution. Output includes: the input data for verification purposes and a table containing: percent of titration; pM ($-\log[M^{2+}]$); $[M^{2+}]$; [EDTA] (all forms); $[EDTA^{4-}]$; $[MY^{2-}]$ (the M^{2+}-$EDTA^{4-}$ complex); and optionally, the volume of EDTA added. Used in Analytical Chemistry and Biochemistry.

Access:

TAURUS: EXECPF,4632,EDTA.

Batch: Contact Curriculum Coordinator.

Documentation: K. Jeffery Johnson, Numerical Methods in Chemistry, p. 202.

- NERNST (Interactive)

Abstract: This program simulates the potential of a $M|M^{z+}$ electrode in an aqueous ammonia solution as a function of pH. The program inputs the number of electrons transferred; the standard reduction potential (e.g., for $Cu^{2+} \rightarrow Cu$, $E° = 0.337V$); the coordination number of the highest amine complex formed; and the logarithms of the step-wise formation constants. The program prints the input data for verification purposes and a table containing the following entries; pH, $[NH_3]$, $[M^{z+}]$

and EMF. Used in Analytical, General and Physical Chemistry.

Access:

TAURUS: EXECPF,4638,NERNST.

Batch: Contact Curriculum Coordinator.

Documentation: K. Jeffery Johnson, Numerical Methods in Chemistry, p. 278.

- DERTI (Batch)

Abstract: DERTI is a generalized data reduction program for analyses by titration of up to 50 data pairs. For any number of titrations, a complete table of first and second derivatives are produced as a table along with interpolation calculations for equivalence point volume and its associated experimental PH or voltage. If more than one equivalence point is expected, DERTI calculates the number of these points requested. Optional summary statistics are available for each titration with only one equivalence point. Used in Biochemistry and in Analytical, General and Physical Chemistry.

Access:

TAURUS: Contact Curriculum Coordinator

Batch: EXECPF,4394,DERTI.

Documentation: Program writeup available from CONDUIT-NCECS, P. O. Box 12175, Research Triangle, North Carolina 27709.

- NEWTON (Interactive)

Abstract: Solves a system of non-linear, simultaneous equations. Used in Analytical and Physical Chemistry and in Numerical Methods.

Access:

TAURUS: 'EXECPF,4632,NEWTON.

Batch: Contact Curriculum Coordinator

Documentation: K. Jeffery Johnson, Numerical Methods in Chemistry, p. 284.

Quantum Mechanics.

- BOX (Interactive)

Abstract: Eigenvalues of a particle in a finite box. Calculates up to six roots of the transcendental equation

$$\frac{2a(2mE)^{\frac{1}{2}}}{h} = \frac{2(V_0-E)^{\frac{1}{2}}E^{\frac{1}{2}}}{2E-V_0}$$

from the input data on the length of the potential well and the height of the well. The energy levels should approach the solution to the particle in

the infinitely high box $V_0 \rightarrow \infty$, $E_n = \frac{n^2h^2}{3^2ma^2}$ (the length of the box being 2a). Used in Physical Chemistry.

Access:

TAURUS: EXECPF,4638,BOX.

Batch: Contact Curriculum Coordinator

Documentation: K. Jeffery Johnson, Numerical Methods in Chemistry, p. 169.

- HMO (Interactive)

Abstract: Solves simple Huckel Molecular Orbital calculations. Used in Inorganic, Organic and Physical Chemistry.

Access:

TAURUS: EXECPF,4632,HMO.

Batch: Contact Curriculum Coordinator

Documentation: K. Jeffery Johnson, Numerical Methods in Chemistry, p. 240.

- JACOBI (Interactive)

Abstract: Matrix Disgonalization. Used in Inorganic, Organic and Physical Chemistry.

Access:

TAURUS: EXECPF,4632,JACOBI.

Batch: Contact Curriculum Coordinator

Documentation: K. Jeffery Johnson, Numerical Methods in Chemistry, p. 260.

- ONELEC (Interactive)

Abstract: Performs the numerical integration of the Schroedinger equation in Chemistry teaching; one electron problem with thirteen solutions. Used in Physical Chemistry.

Access:

TAURUS: EXECPF,0503,ONELEC.

Batch: Unsuited for other than interactive use.

Documentation: Program writeup available from CONDUIT-NCECS.

Thermodynamics.

- ENTROPY (Interactive)

Abstract: Used to calculate the entropy of a molecule in the gas phase from spectroscopic data. The input includes: number of atoms in the molecule; linearity; the temperature (°K); pressure (atm); symmetry factor; multiplicity of

the ground electronic state; the fundamental vibration frequencies; the mass (in grams) of each atom; and the x, y, and z coordinates of each atom relative to an arbitrary origin. The program prints the input data for verification purposes; the three moments of inertia; and the translational, vibrational, rotation and total entropies of the molecule. Used in Physical Chemistry.

Access:

TAURUS: EXECPF,0503,ENTROPY.

Batch: Contact Curriculum Coordinator

Documentation: K. Jeffery Johnson, Numerical Methods in Chemistry, p. 212.

- EQUIL (Interactive)

Abstract: Given the gas phase reaction, $aA + bB \rightleftharpoons cC + dD$, EQUIL calculates the equilibrium constant

$$K_p = \frac{P_C^c \cdot P_D^d}{P_A^a \cdot P_B^b}$$

by minimizing the total free energy function, $G_{tot}(\alpha)$, where α is the extent of reaction ($0 \leq \alpha \leq 1$). The input includes the stoichiometric coefficients, the absolute temperature and the

standard chemical potentials at the specified temperature. The program prints the input data for verification purposes and then a table containing the total free energy as a function of extent of reaction, minimum total free energy, equilibrium position and constant and standard free energy change. Used in Physical Chemistry.

Access:

TAURUS: EXECPF,4632,EQUIL.

Batch: Contact Curriculum Coordinator.

Documentation: K. Jeffery Johnson, Numerical Methods in Chemistry, p. 223.

- FRSTLW (Interactive)

Abstract: FRSTLW is a program designed to aid students in the study of the first law of thermodynamics. A specified overall change in the thermodynamic state of a gas is carried out through a series of arbitrary reversible steps which are determined by the student. The energy quantities E, Q, and W are calculated for each step. The thermodynamic system is limited to an ideal gas with a heat capacity which does not vary with temperature. However, the student may work any number of moles he chooses and he may

assign to the gas any constant molar heat capacity, C, he desires. Only pressure-volume work is considered. Used in General and Physical Chemistry.

Access:

TAURUS: EXECPF,0503,FRSTLW.

Batch: Unsuited for other than interactive use.

Documentation: Program writeup available from CONDUIT-NCECS.

Structure I.

- ABC (Interactive)

Abstract: A simulation of ABC-NMR spectrum. Used in Analytical, Organic and Physical Chemistry.

Access:

TAURUS: EXECPF,4638,ABC.

Batch: Contact Curriculum Coordinator

Documentation: K. Jeffery Johnson, Numerical Methods in Chemistry, p. 162.

- CHEM200 (Interactive)

Abstract: A structure determination from UV spectrum. Used in Organic and Physical Chemistry. Part of a sequence in computer assisted chemistry.

Access: See page 33.

Documentation: Available from Dr. Sam Castleberry Project C-BE., ENL 413, University of Texas at Austin.

- CONTOUR (Interactive)

Abstract: CONTOUR calculates and plots electron density distributions for atomic, hybrid and molecular orbitals. Inputs: type of orbital to be plotted, effective nuclear charges and internuclear distances for the molecular orbitals. Outputs: contour map of the electron density distributions. Used in General and Physical Chemistry.

Access:

TAURUS: EXECPF,4632,CONTOUR.

Batch: Contact Curriculum Coordinator.

Documentation: K. Jeffery Johnson, Numerical Methods in Chemistry, p. 177.

- HATOM (Batch)

Abstract: Program deals with hydrogen ion spectra using Bohr model calculation of energy levels. Inputs: initial quantum state, final quantum

state. Outputs: transition energy, frequency, wavelength, wave number and name of transition series. Used in General Chemistry.

Access:

TAURUS: Contact Curriculum Coordinator.

Batch: EXECPF,4394,HATOM.

Documentation: Program writeup available from CONDUIT-NCECS.

- IDFOU (Batch)

Abstract: One-dimensional Fourier transform. Inputs: total number of positive planes (number of n values in Bragg's Law), period in angstroms (d, in Bragg's Law), position at which program is to start searching for electron density, incrementation of period for searching and structure factors. Outputs: input for verification purposes, arrays of electron densities and position at which atoms reside (only one-dimensional, two-atom centosymmetric structures can be determined). Used in Physical Chemistry.

Access:

TAURUS: Contact Curriculum Coordinator.

Batch: EXECPF,4394,IDFOU.

Documentation: Program writeup available from CONDUIT-NCECS.

- IONCH (Batch)

Abstract: Ionic character determination. Inputs: observed dipole moments (μ), internuclear distance (R), formula, first ionization potentials; PIA, PIB, electron affinities; EAA, EAB, effective nuclear charge; AZ, BZ, and covalent radius of an atom; RA, RB. Outputs: percent ionic character using three methods; PICA, PICB, PICC, electro-negatives using two different methods; ENA, ENB, observed dipole moment μ, and internuclear distance R. Used in Inorganic Chemistry.

Access:

TAURUS: Contact Curriculum Coordinator.

Batch: EXECPF,4394,IONCH.

Documentation: Program writeup available from CONDUIT-NCECS.

- NMR (Interactive)

Abstract: Simulates AB, AB_2, ABS, A_2X_2, and A_2B_3-NMR spectra. Program resolves broad line NMR spectra into component Lorentzian and Gaussian Functions. The input variable "IRESLV" controls the resolution

thus:

IRESLV < 0, both Lorentzian and Gaussian resolution

IRESLV = 0, Lorentzian only

IRESLV > 0, Gaussian only

The input variable "NSMOTH" determines how many times the smoothing procedure is repeated. Used in Analytical, Organic and Physical Chemistry.

Access:

TAURUS: EXECPF,4638,NMR.

Batch: Contact Curriculum Coordinator.

Documentation: K. Jeffery Johnson, Numerical Methods in Chemistry, p. 291.

- POWAC (Batch)

Abstract: Prediction of a position D-S patterns - data from ASTM. Inputs: number of POWDER patterns being processed, description of compound, user identification and date, Debye-Sherrer camera size, number of D-spacing entered for each compound, and D-spacing-intensity pairs along ith the h, k, and 1 Miller indices for each compound. Outputs: input data, and table of positions at which arcs should appear on an X-ray diffraction powder film for each compound. The

table includes: D-spacing, relative intensity, Q factor, θ in degrees, sin θ, $\sin^2\theta$, ARC corr-mm, and HKL. Used in General, Inorganic and Physical Chemistry.

Access:

TAURUS: Contact Curriculum Coordinator

Batch: EXECPF,4394,POWAC.

Documentation: Program writeup available from CONDUIT-NCECS.

- RADIAL (Interactive)

Abstract: This program calculates and plots the radial distribution functions for the 1p, 2s, 2p, 3s, 3p, and 3d hydrogen-like atomic orbitals. Inputs: number - designation of which radial distribution function is to be calculated and plotted, effective nuclear charge and maximum value of R in angstroms. Outputs: input data for verification and a plot of the radial distribution function requested. Used in General and Physical Chemistry.

Access:

TAURUS: EXECPF,4632,RADIAL.

Batch: Contact Curriculum Coordinator.

Documentation: Program writeup available from CONDUIT-NCECS.

- VSEPR (Batch)

Abstract: Geometry of molecules from periodicity and formula. Inputs: number of ligands, number of valence electrons on each ligand atom, and formula and/or of the compound. Outputs: input data, coordination type predicted and molecular geometry prediction. Used in General Chemistry.

Access:

TAURUS: Contact Curriculum Coordinator

Batch: EXECPF,4394,VSEPR.

Documentation: Program writeup available from CONDUIT-NCECS.

Kinetics.

- ABCANL (Interactive)

Abstract: Program solves consecutive first order kinetics. Program solves the kinetic system

$$A \underset{k_{21}}{\overset{k_{12}}{\rightleftharpoons}} B \underset{k_{32}}{\overset{k_{23}}{\rightleftharpoons}} C$$

Used in Biochemistry, and in Organic and Physical Chemistry.

Access:

TAURUS: EXECPF,4638,ABCANL.

Batch: Contact Curriculum Coordinator.

Documentation: Program writeup available from CONDUIT-NCECS.

- CHEM32 (Interactive)

Abstract: Deals with simple first order kinetics by visible spectroscopy. Used in Biochemistry, and in General and Organic Chemistry. Part of a sequence in computer assisted chemistry.

Access: See page 33.

Documentation: Available from Dr. Sam Castleberry Project C-BE, ENL 413, University of Texas at Austin.

- RADIO (Interactive)

Abstract: Simulates overlapping radio-decay curves:

$$A_{tot} = A_1(t) + A_2(t)$$

$$= A_{10}e^{-\lambda_1 t} + A_{20}e^{-\lambda_2 t}$$

$$= A_{10}\mathrm{EXP}[0.693t/\tau_1] + A_{20}\mathrm{EXP}[0.693t/\tau_2]$$

where A_{tot} is the total observed activity, $A_1(t)$ and $A_2(t)$ are activities due to isotopes 1 and 2,

λ_1 and λ_2 are the decay rate constants, and τ_1 and τ_2 are the half-lives. Input to this program includes A_{10}, A_{20}, τ_1 and τ_2. The expression for the total activity is then calculated over the range where $0 \leq T \leq TMAX$ where TMAX is four times the longer half-life. Used in Biochemistry, and in General Physical Chemistry.

Access:

TAURUS: EXECPF,4632,RADIO.

Batch: Contact Curriculum Coordinator

Documentation: Available from CONDUIT-NCECS.

Miscellaneous.

- IDGAME (Interactive)

Abstract: Qualitative organic analysis with its varied chemical and instrumental content provides the basis for the identification game. The user requests test results for an unknown compound from 40 different analyses. Each test has an assigned cost so that optimization of the identification can be provided as a criterion for analysis techniques: minimum cost for analysis. No programming experience is necessary to run this game. Used in Organic Chemistry.

Access: Not currently available. Expected availability October, 1973.

Documentation: Available from CONDUIT-Texas.

- MASSPEC (Interactive)

Abstract: Program simulates a mass spectrometer. Ions from a source, with some thermal kinetic energy, are accelerated through a potential and deflected in a magnetic field to a detector which measures the ion current. The problem is to find the charge-to-mass ratio of the ions observed, and from this information to determine the isotope which is observed. The parameters involved in the simulation are: the mass of each isotope present, the degree of ionization of each isotope, the relative abundance of each possible ion, strength of the magnetic field, range of voltage to be swept, increment to be used in sweeping the voltage and width of the detector slit. The computer calculates an ion current for each value of voltage as it sweeps over the given range. The results are then plotted on the teletype. Used in General and Inorganic Chemistry.

Access:

TAURUS: EXECPF,0503,MASSPEC.

Batch: Unsuited for other than interactive usage.

Documentation: Available from CONDUIT-NCECS.

- STOIC (Batch)

Abstract: This program uses the basic equation XA + YB = ZC + WD, and calculates product and reactant amounts. In addition to determining the limiting reagent, the following equations were used in determining the limiting reagent in a chemical reaction:

$PF_3 + PF_2 = P_2F_5$

$2PF_3 + O_2 = 2POF_3$

$4Al + 3O_2 = 2Al_2O_3$

$2H_2 + O_2 = 2H_2O$

$2Mg + O_2 = 2MgO$

$H_2SO_4 + MgCO_3 = MgSO_4 + H_2CO_3$

Used in General Chemistry.

Access:

TAURUS: Contact Curriculum Coordinator.

Batch: EXECPF,4394,STOIC.

Documentation: Available from CONDUIT-NCECS.

Instructions for Using CHEM200 and CHEM32

CHEM200 and CHEM32 are two modules in a series of computer-assisted Chemistry programs. They are written in CLIC*, a CAI author language developed at the University of Texas at Austin.

1. Follow usual LOGIN procedures on a terminal.
2. After "CC:" is printed, type

   CLIC ® (® denotes depressing the carriage return key)
3. There will be a series of questions asked requesting your social security number, your name, and the CLIC course. When the CLIC course is requested, enter:

   CHEM,CHEM32 ® (no spaces)

   or

   CHEM,CHEM200 ®

   This will allow you to interact with the selected program.

*For detailed information on accessing CLIC, users should refer to "General Procedures for Accessing CLIC via TAURUS, Computation Center Publication TPB-150.

CONDUIT Programs for Economics

MATERIALS BY: Stanley E. Wilson and Ray Billingsley
Department of Agricultural Economics
Texas A & M University
College Station, Texas

Supporting Documentation:

Paper delivered at Atlantic Conference on Computers in the Undergraduate Curricula describing actual use and philosophy of "non-blackbox" use of simulations.

S. E. Wilson, R. Billingsley, "Computer Simulation of Economic Models for Instructional Usage", Proceedings of a Conference on Computers in the Undergraduate Curriculum, Atlanta, 1972. (Available at most computer center libraries).

Texas A & M model documentation explains operation and use of the theoretical model as well as the program.

Programs Currently Available:

Programs are documented in Texas A & M "model" documentation. However, each program needs slight revision to work correctly and would be more effective with plotting routines.

- SIMPLE FIRM (Batch)

  Abstract: This model simulates a basic model of a firm. It is suitable for a sophomore level principles course or a junior-senior micro-economics course. Documentation available. Would be effective with SIMPLOTTER routine.

  Access: Not currently available. Estimated availability is October, 1973.

- MARKET (Batch)

Abstract: Program simulates the basic market model for demand and supply analysis. Model has demand curve in which quantity supplied is function of price. Documentation available. More effective with plot.

Access:

Batch: EXECPF,4343,MARKET

MATERIALS BY: W. C. Brainard (also Tobin and Nordhaus)
Department of Economics
Yale University
New Haven, Conn.

Supporting Documentation:

A description of the equations in the model and parameter values with sample assignments is available locally. Essential for use.

Programs Currently Available:

- BULLPUP (Batch)

Abstract: An economic policy game intended to provide students with opportunity to exercise and develop understanding of macro-economics by acting as policy-makers in a simulated economy. The structure of the economy is more complicated than simple textbook models. The model uses 39 equations to determine potential output, aggregate demand, demand for assets,

and wage-price productivity. Used in slightly different forms at Yale University, 1969-70, 1970-71, 1971-72.

Access:

Batch: EXECPF,4343,BULLPUP

MATERIALS BY: William Cage
Department of Economics
Wake Forest College
Winston-Salem, North Carolina

Supporting Documentation:

Program is self-documenting.

Program Currently Available:

- MACWH (Interactive)

Abstract: This program allows user to control functioning of U. S. economy. Model is based on WHARTON model of U. S. economy. Currently available as an interactive BASIC program.

Access:

TAURUS:
1. Login according to the usual procedure.
2. When the "CC:" message is received, type
   READPF,4751,MACWH®
   (® denotes the return key)
3. When the "CC:" appears, type
   BASIC®

4. In response to "OLD OR NEW FILE:", type

   OLD®

5. In response to "FILE NAME:", type

   MACWH®

6. Logout according to the usual procedure.

CONDUIT Programs for Mathematics

CONDUIT selected an integrated Linear Algebra package by Donald McLaughlin, Augustana College for the 1972 transportability test. The package consists of a text, four subroutines, and one main program. The programs are available in Fortran. These materials have been well received nationally both within and outside of CONDUIT.

Materials and Supporting Documentation:

Donald McLaughlin, A Computer Oriented Course in Linear Algebra, (University of Iowa, Iowa City, 1973). Available from Computer Center at $2 a copy (180 pages).

Programs and Subroutines:

- ECHLN (M,N,A,KRANK) Subroutine

  Abstract: Subroutine ECHLN transforms matrix A of M rows and N columns to echelon form by elementary row operations. KRANK is the number of non-zero rows in the echelon form. Entries less than or equal to 1E-03 are taken as 'zero'.

  Access: ECHLN is a permanent file on the permanent file set with the Identification Number (ID) 1304.

Usage as a Fortran Subroutine: The mainline program must contain at least the following:

1. DIMENSION A(M,N)
2. CALL ECHLN (M,N,A,KRANK)

Description of Parameters:

A = the matrix to be transformed. It is returned from ECHLN

M = the number of rows in A.

N = the number of columns in A.

KRANK = the rank of A returned by ECHLN.

Subroutines and Function Subprogram Required: None.

Accuracy: Entries less than or equal to 1E-03 are taken as zero.

Note: ECHLN is intended as a curriculum tool for a course in linear algebra and should not be used for large arrays or those requiring greater accuracy.

Method: ECHLN searches for pivots and uses elementary row operations to transform the matrix.

Donald E. McLaughlin, A Computer Oriented Course in Linear Algebra, Augustana College, July, 1971, pp. 22-23.

Sample Fortran Program:

```
      DIMENSION A(5,6)
      DO 10 (I=1,5)
      READ 5, (A(I,J),J=1,6)
 5    FORMAT (F3.0,1X)
10    CONTINUE
      CALL ECHLN (5,6,A,KRANK)
      DO 15 I=1,5
15    PRINT 20, (A(I,J),J=1,6)
20    FORMAT (' ',6(2X,F10.3))
      PRINT 25,KRANK
25    FORMAT (' ','KRANK='I1)
      END
```

- REDECH (M,N,AUG,JRANK,KRANK) Subroutine

Abstract: Subroutine REDECH transforms matrix AUG of M rows and N columns to reduced echelon form by elementary row operations. KRANK is the number of non-zero rows in the reduced echelon form of matrix AUG. JRANK is the number of non-zero rows in the reduced echelon form of matrix AUG with the last column deleted. Entries less than or equal to 1E-03 are taken as 'zero'.

Access: REDECH is a permanent file in the permanent file set with the Identification Number (ID) 1304.

Usage as a Fortran Subroutine: The mainline program must contain at least the following:

1. DIMENSION A(M,N)
2. CALL REDECH (M,N,A,JRANK,KRANK)

Description of Parameters:

A = the coefficient matrix to be transformed.

M = the number of rows in A.

N = the number of columns in A.

JRANK = the number of non-zero rows in the reduced echelon form of A.

KRANK = number of non-zero rows in the reduced echelon form of A with the last column deleted.

Subroutines and Function Subprograms Required: None.

Accuracy: Entries less than or equal to 1E-03 are taken as zero.

Note: REDECH is intended as a curriculum tool for a course in linear algebra and should not be used for large arrays or those requiring greater accuracy.

Method: REDECH searches for pivots and uses elementary row operations to transform the matrix.

Donald E. McLaughlin, A Computer Oriented Course in Linear Algebra. Augustana College, July, 1971, pp. 41-50.

Sample Fortran Program:

```
      DIMENSION A(5,6)
      DO 10 I=1,5
      READ 5, (A(I,J),J=1,6)
 5    FORMAT (F3.0,1X)
10    CONTINUE
      CALL REDECH (5,6,A,JRANK,KRANK)
      DO 15 I=1,5
15    PRINT 20, (A(I,J),J=1,6)
20    FORMAT (' ',6(2X,F10.3))
      PRINT 25 KRANK,JRANK
25    FORMAT (' ','KRANK=',I2,'JRANK=',I2)
      END
```

- GRAM (M,N,X,Y) Subroutine

Abstract: Given a basis X of M row vectors for a subspace of an N-tuple space, subroutine GRAM computes an orthonormal basis Y of row vectors.

Access: GRAM is a permanent file in the permanent file set with the Identification Number (ID) 1304.

Usage as a Fortran Subroutine: The mainline program must contain at least the following:

1. DIMENSION A(M,N),B(M,N)
2. CALL GRAM (M,N,A,B)

Description of Parameters:

A = a basis of row vectors for a subspace of an n-tuple space.

M = the number of rows in X.

M = the number of columns in X.

B = the orthonormal basis of row vectors returned by GRAM.

Subroutines and Function Subprogram Required: None.

Accuracy: Single precision.

Method: GRAM-SCHMIDT process for exhibiting an orthonormal basis.

Donald E. McLaughlin, A Computer Oriented Course in Linear Algebra, Augustana College, July, 1971, pp. 106-108.

Sample Fortran Program:

```
      DIMENSION A(4,6), B(4,6)
      DO 10 I=1,4
      READ 5, (A(I,J), J=1,6)
    5 FORMAT (F2.0,1X)
   10 CONTINUE
      CALL GRAM (4,6,A,B)
      PRINT 15
   15 FORMAT (' ORTHONORMAL BASIS')
      DO 20 I=1,4
   20 PRINT 100, (B(I,J),J=1,6)
      END
```

- CHAREQ (N,A,B) Subroutine

Abstract: Subroutine CHAREQ finds the coefficients in the characteristic polynomial of an N by N real matrix A. B is a vector containing the coefficients of the characteristic polynomial in descending powers of lambda. P, Q, and trace are work areas.

Access: CHAREQ is a permanent file in the permanent file set with the Identification Number (ID) 1304.

Usage as a Fortran Subroutine: The mainline program must contain at least the following:

1. DIMENSION A(N,N), B(N)
2. CALL CHAREQ (N,A,B)

Description of Parameters:

A = the matrix whose characteristic polynomial is to be determined.

N = the dimension of A and of B, $N \leq 20$.

B = the vector containing the coefficients of the characteristic polynomial in descending powers of lambda.

Subroutines and Function Subprograms Required: None.

Accuracy: Single precision.

Note: CHAREQ is intended as a curriculum tool for a course in linear algebra and should not be used for large arrays. More efficient approaches are available for large matrices.

Method: The method used is very sensitive to the size of the array and is not recommended for matrices larger than 10 by 10.

Donald E. McLaughlin, A Computer Oriented Course in Linear Algebra, Augustana College, July, 1971, pp. 122-126.

Sample Fortran Program:

```
      DIMENSION A(6,6),B(6)
      DO 10 I=1,6
      READ 5, (A(I,J),J=1,6)
    5 FORMAT (F3.0,1X)
   10 CONTINUE
      CALL CHAREQ (6,A,B)
      PRINT 100,(B(I),I=1,6)
  100 FORMAT (' ',6(2X,F10.3))
      END
```

- SIMPLX (Main Program)

Abstract: Solution of a linear programming problem by the Simplex method.

Access: SIMPLX is a permanent file in the permanent file set with the Identification Number (ID) 1304.

Usage as a Fortran Subroutine: The mainline program must contain at least the following:

1. DIMENSION A(M2,N1),KSAVE(M),LSAVE(M)
2. CALL SIMPLX(A,M2,N1,KSAVE,LSAVE,M,K)

Note that the subroutine prints out the simplest tableau after every stage as well as the maximum value of the objective function and the optimal solution.

Description of Parameters:

M = number of constraint equations.

N = total number of variables, including the slack, surplus, and artificial variables.

K = number of artificial variables.

A = the simplex tableau, including the Z-row and the Z(m)-row. The coefficients of the artificial variables must occur in the columns immediately preceeding the column of constants. The Z(m)-row has entry 1 for an artificial variable column, 0 otherwise.

M2 = M+2 = number of rows in A.

N1 = N+1 = number of columns in A.

KSAVE = a vector of M elements, where each KSAVE(I) is the subscript of the slack or artificial variable, 0 otherwise.

Subroutine and Function Subprograms Required: None.

Accuracy: Single precision.

Method: Simplex method.

Donald E. McLaughlin, A Computer Oriented Course in Linear Algebra, Augustana College, July, 1971, pp. 145-172.

Sample Fortran Program:

```
      DIMENSION A(6,8),KSAVE(4),LSAVE(4)
      READ(1,5) M,N,K
    5 FORMAT (4I2)
      M1=M+1
      M2=M+2
      N1=N+1
      DO 10 I=1,M2
      READ (1,6) (A(I,J),J=1,N1)
    6 FORMAT (8F2.0)
   10 CONTINUE
      READ (1,5) (KSAVE(I),I=1,M)
      READ (1,5) (LSAVE(I),I=1,M0
      CALL SIMPLX (A,M2,N1,KSAVE,LSAVE,M,K)
      END
```

CONDUIT Programs for Physics

The CONDUIT/Texas physics programs were originally developed for use in Project COEXIST at Dartmouth College by Prof. John R. Merrill. The work was supported by an NSF grant (NSF-GJ-650) and was released as part of a manual, "The Computer in Second Semester Physics". The manual is comprised of chapters whose contents include introductions, basic equations, problems, and projects. All programs are written in BASIC and are interactive. Each program is contained as a permanent file (named with the program name) in the set of permanent files with identification number, 0044.

Programs Currently Available:

STANWAV - User sweeps through frequency to find resonance peaks at a given location in a 1-dimensional chamber closed at both ends.

EV - Follows equal potential and field lines for a system of point charges.

EV2 - Plots the field lines and equal potential lines found by EV.

SCHHUNT - Finds energy Eigen values to Schrodinger's equation. Plots the resulting wave function.

IVSANGL - Calculates wave intensity averaged over phase at observation points around a circle that encompasses the sources.

SCATTER - Calculates the trajectory of particles of various energies incident on a scattering potential.

SPHRPLT - Plots waves bouncing off a spherical mirror.

RAYTRAS - Plots light rays through various lenses.

APOLLO8 - Earth to moon orbit simulation program (Plots).

SPECSIM - Mass spectrometer simulation program (Plots).

NSLIT - Plots multiple slit interference patterns.

MIRROR1 - Calculates coordinates of light rays reflecting from mirrors.

MIRROR2 - Plots light rays reflecting from mirrors.

SPRINGS - Plots the motion of coupled springs.

DISTORT - Plots geometric figures as they are Lorentz contracted.

BFIELD - Traces magnetic field lines from a group of coils.

BODY3 - Calculates positions of 3 bodies as they interact with each other through a gravitational force.

LAPLACE - Solves Laplace's equation over 2-dimensional grid points.

THKLENS - Traces light rays through regions with spherical interfaces and various indexes of refraction.

FSCOEF - Calculates Fourier coefficients for any periodic function or periodic set of data.

PULPROP - Propagates a Gaussian pulse along a 1-dimensional lattice (Plots).

BINARY - Produces an illuminosity vs. time curve for a binary star system.

DFMA2 - Calculates orbit of object in a gravitational field.

POTSHOT - A game which calculates and plots projectile trajectories.

XRAYS2 - Simulates the Laue x-ray back reflection pattern from a single crystal (Plots).

KEPLAWS - Numerically demonstrates Kepler's 3 laws.

SCHEQY - Used to hypothesize the energy Eigen values that produces Eigen functions that solve Schrodinger's equation.

SHUNT30 - Hunts to find energy Eigen values of the Radial Schrodringer equation (Plots).

HARPLOT - Harrison and Brillion zone construction for 2-dimensional crystal structure.

Running the Programs via TAURUS

1) Login according to the usual procedure.

2) When the "CC:" message appears, type

   BASIC®

   (® denotes the return key)

3) In response to "OLD OR NEW FILE:", type

   OLD®

4) In response to "FILE NAME:", type

   <name>®

   (*<name>* is the program name)

5) In response to "FILE IDENTIFIER OR 'RESTART':", type

   0044®

6) In response to "READY", type

   RUN®

7) At the program's conclusion, "READY" will be typed. To run another program, type OLD® , and proceed from 4) above. To terminate BASIC, type

   EXIT®

   in response to "READY".

8) Logout according to the usual procedure.

CONDUIT Social Science Data Files

Eleven Social Science data files are now available on the UT-Austin CDC 6600/6400 System. The data sets are relevant in several disciplines, which include Political Science, Sociology, Economics, Government, and History. The data files were originally developed as part of a Regional Social Science Data Archive project at the University of Iowa.

Each data file can be analyzed using the SPSS (Statistical Package for the Social Sciences) System. Each data set is accompanied by a detailed report which includes data analyses, tables, a codebook describing each variable in the file with its questionnaire item and code, and a set of student exercises.

Manuals for each of the data sets described on the following pages are available, at cost, from the Regional social Science Data Archive, University of Iowa, Iowa City, IA 52240. A copy of each of the manuals has been placed in the Reference Room (WCH 9).

The SPSS system is documented in Statistical Package for the Social Science, by Nie, Bent, and Hull (McGraw-Hill, 1970), available from book stores.

Users at other sites who wish to obtain machine-readable copies of the data files may do so by writing to the Regional Social Science Data Archive at the University of Iowa.

1. Public Reaction to Civil Disobedience — 716 cases

This data set has compiled questionnaire data about public attitudes toward protests, demonstrations, Viet Nam and integration. In the Introduction section of the manual, the question is asked, "Who favored and who opposed demonstrations and the other forms of political action that characterized the sixties? Why did they approve or disapprove of these types of activities? Did the public reaction to demonstrations have an effect on the outcome of the 1968 presidential election?" The data that will allow you to answer these and other questions about the public reaction to protests and demonstrations was taken from a 1968 sample survey of the adult population of the United States conducted by the Survey Research Center at the University of Michigan.

2. Voting Behavior in Western Europe
   a. Great Britain — 917 cases
   b. West Germany — 992 cases

The data which may be accessed by following the instructions in this manual consist of responses given by British and German voters to a national parliamentary election was held in Great Britain in March, 1966. The Labor Party won 48 percent of the vote, the Conservative Party won 42 percent, and the Liberal Party won 9 percent. Shortly after the election, Professor David Butler of Oxford University and Professor Donald Stokes of the University of Michigan interviewed a sample of British citizens of voting age, chosen to be representative of the entire British voting population. They asked their respondents whether they had voted, for which party they had voted, and numerous other questions about their political attitudes and backgrounds. The answers to these questions constitute a large set of data on British voting behavior.

A similar set of data on the attitudes and voting intentions of German citizens was gathered by Professor Rudolf Wildenmann of the University of Mannheim shortly before the German parliamentary election held in September, 1969. In that election, the Christian Democratic Union (CDU/CSU) won 46

percent of the vote, the Social Democratic Party won 43 percent of the vote, the Free Democratic Party won 6 percent of the vote. Professor Wildenmann and his associates interviewed a sample of Germans of voting age, chosen to be representative of the entire German population, and asked them how they intended to vote, as well as a series of other questions about their political attitudes and backgrounds similar to those which had been asked of the British respondents.

Students can analyze voting participation in Germany, Great Britain; the relationship between social background and voting choice; political influences on voting choice; and relative influence of candidate and party preference on voting choice.

3. Voting Behavior in the United States 1952-1968 — 2526 cases

Voting Behavior in the United States: 1952 to 1968 was written to make it possible for students to explore questions about the decisions that citizens make in choosing a president. This book and the data set make it possible to answer a very large number of questions about citizens' decision making. The data set combines sample surveys from each of the presidential elections between 1952 and 1968. Fifty questions were chosen which were asked of a sample of the adult population immediately before or immediately after each of these elections. Students can investigate both single elections and changes between elections. These data sets were made available by the Inter-University Consortium for Political Research of the University of Michigan.

4. Changing Attitudes Toward Integration, 1946-1966 — 979 cases

Much of the change in the position of blacks in American society has been brought about through programs of the national, state, and local governments. However, fundamental acceptance of blacks as equals in the society requires more than governmental programs. It is also necessary that there be a

change in white attitudes. Without substantial changes in public attitudes, blacks will continue to be viewed as peripheral members of the society.

This book and the data set that is used with it are designed to permit investigation of the extent and nature of the change in the attitudes of whites between 1946 and 1966. How much have attitudes changed? What groups in society have changed more than others? How much of the change can be accounted for by generational changes in the population? All of these questions, and many more, can be investigated with this data set.

Government recorded information provides a good indication of the extent of change in income, educational opportunities, and other facets of social and economic change. There is no comparable government record of attitudinal change. Fortunately, the National Opinion Research Center at the University of Chicago conducted nationwide surveys in both 1946 and 1966 in which they asked comparable questions to determine the attitudes of whites toward Negroes. By combining these two data sets it is possible to inevestigate the questions outlined above. A complete list of the questions included in the data set is found in the codebook at the back of the book.

5. Citizens and the Political System* 4884 cases

This data set contains two studies and suggests how these data on public attitudes can be used to answer meaningful questions about politics. Two different data sets are used in the manual. The first data set is taken from a study conducted by Gabriel Almond and Sidney Verba. Their major research report was The Civic Culture. Approximately 1,000 people were interviewed in the United States, Great Britain, West Germany, and Italy. The respondents were asked the same questions in each country. In the analyses each country may be looked at separately or any combination of the countries may be used.

*The manual and instructor's guide for Citizens and the Political System may be obtained from Harper and Row publishers.

The second data set is taken from the Iowa Legislative Research Project. Approximately 1,000 Iowans were interviewed. This data set is used to supplement the questions that were asked by Almond and Verba. It cannot be combined with the data from the four countries since most of the questions are quite different from those used by Almond and Verba.

6. Individual in Society — 4495 cases
   a. Small Data Set (43 of 171 variables)
   b. Sample of large data set (40% of respondents, all variables)

Some of the questions that one might want to investigate are:

1. To what extent does the social class of parents influence the social class of children--to what extent is there upward and downward mobility in the society?
2. Are the relationships between parents and children changing in a more permissive way or are they remaining largely static?
3. What is the relationship between social class and political participation? Why should members of one class participate more than another?
4. What are the social sources of attitudes on racial integration? What are the kinds of social forces that seem to lead to favoring and opposing integration?
5. How was religion related to voting in the presidential elections of 1960 and 1964?

These are only a few illustrations of the kinds of questions that can be answered with the data that is associated with this data set. As the student examines the data that is available, he should find many more questions that are particularly interesting to him.

Data from three different studies are used in the set. Two of the studies were conducted by the Survey Research Center. One was conducted in 1960 and the other in 1964. Approximately 1,500 respondents were interviewed in each of the studies. Only a part of the data from each of the studies is

used in the manual, but there are sufficient data for examining a number of different societal structures. The third study was conducted by Gabriel Almond and Sidney Verba. Their major research report was The Civic Culture. They asked a number of interesting questions about relationships in families and in schools.

7. Public Attitudes Toward Democracy in Post-War Germany — 1038 cases

Students can analyze attitudes toward the Third Reich, public understanding of the new regime (1959), the responsiveness of Bundestag Deputies, and Neo-Nazism.

The data which students will use for their analyses was taken from a survey conducted by the Institute fur Demoskopie at Allensback in Germany. The Institute is a German public opinion polling organization which has done a great deal of research on public attitudes since 1949. The survey that will be analyzed was conducted in 1959. Thus, students will be able to examine German knowledge of and attitudes toward the Federal Republic ten years after it was founded.

8. Regime Change in France: The Birth of the Fifth Republic — 804 cases

Students can analyze attitudes leading to support and opposition to the new constitution, the social basis of attitudes toward the new constitution, and attitudes toward DeGaulle as an influence in the adoption of the new constitution.

In June, 1958 the Fourth Republic of France died and in September the Fifth Republic was born. Almost eighty percent of those voting in the referendum of September cast their ballots in favor of a new constitution, and in this act rejected the institutions under which France had been ruled since the end of the second world war. This was an extraordinary event; few times in western history have the citizens of a free nation gone to the polls in peacetime to completely restructure the basic institutions of their government.

What would lead a nation to such drastic action? What political events, what social and political problems could have precipitated such a crisis in the history of this action? These are the questions that students will be able to answer with the workbook and the data set that is used with it.

In 1958 Georges Dupeux, Francois Goguel, Jean Stoetzel, and Jean Touchard conducted several successive surveys of French public opinion. The first survey was conducted before the September referendum and asked respondents about their attitudes toward the Fourth Republic and the proposed new constitution. A second set of interviews was conducted after the November election of the first Parliament of the Fifth Republic. This survey asked about attitudes toward the new constitution and asked questions about voting in the parliamentary election. This data set, made available by the Inter-University Consortium for Political Research, provides a unique opportunity to study the forces that led to the dissolution of one regime and the adoption of another.

9. The American Frontier: 1850-1880 4452 cases

Before anyone, historian or student, can begin to address himself to general theories and questions about the American frontier, it is necessary to gain some basic understanding of the more specific aspects of the settlement and development of the frontier region. One would need to know, for instance, what type of people settled on the frontier: where they came from, how long they stayed, their age, etc. It is also important to gain some knowledge of the economic conditions of the settlers: how much land they owned, its value, the amounts of livestock and machinery, etc. This book, The American Frontier: 1850-1880, has been written so that students can begin to answer some of these basic questions for themselves. In working through the exercises they should gain some understanding of the general demographic and economic factors which contributed to American's frontier experience. They will further learn something about the forming and testing of hypotheses, and of the role of the computer in modern historical research.

The data set contains information on farmers in six eastern Iowa counties for the period 1850-1880. This material was taken from the manuscript census records in the possession of the Iowa State Historical Society, and represents many months of tedious research and coding. As such it is an invaluable source of readily available data on one portion of the American frontier.

APPENDIX A:

DATA SET NAMES AND LOCATION

UNIVERSITY OF TEXAS AT AUSTIN

CONDUIT Social Sciences Data Bases

Manual Title	Original Data Set Name*	U. T. File Name	U. T. File Identifier	Number of Cases
Public Reaction to Civil Disobedience	SPSS278A	CIVDIS	4979	716
Voting Behavior in Western Europe				
a. Great Britain	SPSS409C	BRITAIN	4979	917
b. Germany	SPSS478	GERMANY	4979	992
Voting Behavior in United States, 1952-1968	OPINION	VOTING	4980	2526
Changing Attitudes Toward Integration, 1946-66	SPSS250A	INTGRAT	4979	979
Citizens and Political System	POLSCI	CITIZEN	4978	4884
		USA	0116	970
		UK	3966	963
		W. GERM	3952	955
		ITALY	3028	995
Individual in Society				
a. Small data set	SOCIOLOGY	SOCIOL	4977	4495
b. 40% sample data set	SAMPLE.SOC	SOCSAMP	0497	1750
Public Attitudes Toward Democracy in Post-War Germany	GERMAN	POSTWAR	4208	1038
Regime Change in France: The Birth of the Fifth Republic	SPSS437A	REPUB5	0750	804
The American Frontier: 1850-1880	FRONTIER	FRONTIR	4208	4452

*This is the data set name used in the manuals. The corresponding U. T. File name must be used when running locally.

APPENDIX B: Data Sets with Subfiles

CIVDIS

BLKWHT...539 cases
BLK.....117 cases

VOTING

E52...513 cases
E60...491 cases
E64...506 cases
E68...510 cases
E56...506 cases

CITIZEN

USA.....970 cases
UK.....963 cases
WGERM...955 cases
ITALY...995 cases
IOWA...1001 cases

SOCIOL

US1960....1954 cases
USA1964...1571 cases
ALMVERB....970 cases

SOCSAMP

US1960....751 cases
USA1964...615 cases
ALMVERB...384 cases

FRONTIR

Y1850....1190 cases
Y1860....1051 cases
Y1870....1065 cases
Y1880....1146 cases

APPENDIX C: Deck Set Up, UT-Austin

I. All data bases except SOCSAMP

```
User Identification Card
Password Card
JOB,TM=100.
READPF,nnnn,XXXX.
SPSS.
7/8/9  End of record
GET FILE XXXX
  .
  .  other SPSS control cards
  .
6/7/8/9  End of file
```

nnnn stands for the number in the column headed "U.T. file identifier."

XXXX stands for the name in the column headed "U.T. file name."

II. For SOCSAMP only

```
User Identification Card
Password Card
JOB,TM=100.
RFL,130000.
REQUEST,SOCSAMP,0497/0000,RO,HY.
SPSS.
7/8/9  End of record
GET FILE  SOCSAMP
  .
  .  other SPSS control cards
  .
6/7/8/9  End of file
```

APPENDIX D: Variables Available in Small Data Set for Individual in Society (SOCIOL)

The following variables, a subset of those listed in the manual for The Individual in Society, are available in the small data set SOCIOL:

RACE	NACTHELP
AGE2	INTGKEEP
RESPEDU2	INTGOCCR
HEDOCC2	HEARHAPN
SUBCLAS2	CHLINWIT
PRNTCLS2	REFRAME
SOCMOBIL	BUSSING
FNYINCM2	BUSTALK
FATHOCC2	FORCDBUS
INFLTEEN	OPENHOUS
TEENCMPL	STRNGFEL
GVPRONGR	PRSNINTG
MINDMADE	GRDSCINT
DOMORPTY	INTGJRHI
GVGNTINT	HISCINTG
FRAMOREF	JOBINTGR
MDMADINT	SHOPINTGR
PTYDOMOR	FRNDWITE
NGPOSCHG	NGFAVDSG
NGPSHFAS	WTFAVSEG
VIOLNGRO	RSPFAVIN

All variables are available in the 40% sample data set (SOCSAMP).